

REPORT ARTICLE

Pharmacy practice in Singapore and training experiences in the United States

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Abstract

Hospital pharmacy practice continues to evolve around the world. Many countries have expanded the role of the pharmacist, moving them from dispensing of medications to taking an active role in the health of patients. Technology is playing a part in this transformation. The optimal role for hospital pharmacy practice is to make pharmacists responsible and accountable for the medication use system. This article describes the education and current practice of pharmacists in Singapore and their support and utilization of residency training in the United States. In addition, it also discusses the residency program at one hospital in the United States and their approach to mentoring and training future pharmacists to practice in the newly developing role taking place in Singapore.

Introduction

Pharmacy practice in Singapore continues to evolve, allowing for extended opportunities for pharmacists to be more focused on the patient and improved use of medications (Channel News Asia, 2011; Business Times, 2010).

Pharmacists in Singapore currently undertake a four-year Bachelors of Pharmacy degree from the National University of Singapore (NUS) Department of Pharmacy – this is the first and only Pharmacy school in

Singapore. Prior to university entry, all students have to go through the 2-year junior college Cambridge GCE 'A' Level education typically including the pure basic sciences (Chemistry, Biology and Physics) and Mathematics. The NUS Department of Pharmacy typically enrolls the top 15% of the students as the entry criteria for the professional degree. After graduation, students undertake one year of pre-registration pharmacy training to attain the practicing license – 3 months of which

is included in the 2nd and 3rd year of pharmacy school as two 6-week rotations in both community pharmacy and hospital pharmacy (NUS Pharmacy website, 2012).

The subsequent 9-month pre-registration training is usually either in the community or hospital setting. The hospital training would be similar in concept to a general residency, where a student trains in one practice setting. If a student is placed in a hospital pharmacy –typically including rotations in the outpatient pharmacy, the inpatient pharmacy, drug distribution, drug information and certain clinical electives. The graduates are trained under the supervision of pharmacist preceptors in the hospital, typically having at least 2 in-house case presentations and clinical interventions logged as part of their training program. The diversity of medical disciplines and pharmacy services experienced would vary with the institution of training.

Similar to other countries in Asia, doctors have traditionally both prescribed and dispensed drugs in the community from their clinics with the help of clinic assistants (Wagstaff, 2007) Community pharmacy consists of over-the-counter sales and pharmacy only medicines (those that do not require a doctor's prescription), counseling services and also filling prescriptions for some patients who prefer to obtain their medications from the pharmacy. In the United States, pharmacists are regulated separately from physicians (or if physicians choose to dispense, they need to be registered with the board of pharmacy), specifying that only pharmacists may supply prescribed pharmaceuticals to the public, and that pharmacists cannot form business partnerships with physicians.

There is a paucity of research on the perceptions of pharmacists in Asia and Singapore. Pharmacists were seen as medical doctor's assistants in some countries, and one who followed doctors'

instruction with rare personal initiatives. In a Taiwan study, 47.5% of respondents (n = 514) felt that pharmacists should not question physicians about prescriptions and 80% of the respondents agreed that the only responsibility of a pharmacist was to accurately dispense medication as prescribed (Wen *et al*, 2007). The reported advice-seeking behavior from patients with regard to minor ailments to general health advice was considered low, with the frequency being roughly one in every ten people visiting a pharmacy in Singapore. More than half of the respondents claimed that they had never consulted a pharmacist for minor ailments, such as cough, cold, diarrhea, gastric discomfort etc. The number of respondents that would consult a pharmacist immediately when they experienced these symptoms was about half of those who would have gone to a doctor (Chui and Li, 2005).

Hospital Pharmacy practice in Singapore is similar in structure to the US practice model. Major responsibilities in Singapore include medication dispensing, counseling and involvement in distribution and supply of inpatient medications. The hospital pharmacist also documents, reports and manages adverse drug reactions, and evaluates the appropriateness of drug use. For pharmacists who are more experienced, they will take the initiative to attend ward rounds with doctors and optimize the pharmacotherapy for their patients. Sterile products and total parenteral nutrition are processed and compounded usually by a central pharmacy lab (Singapore Pharmacy Council website, 2012).

Clinical pharmacists who round with the medical teams may still have staffing responsibilities in addition to order verification duties to help ease the workload of distribution and discharge dispensing responsibilities. They are also involved in medication reconciliation to help provide continuity

of care during a patient's course in the hospital (Lim et al, 2004). Most hospitals have now implemented electronic medical and pharmacy systems, and increased the recruitment of pharmacists, which have helped to optimize patient care and pharmacokinetic monitoring.

In recent years, much has been done to raise the awareness of the pharmacist role—where pharmacists run disease management clinics in the hospitals such as the anticoagulation clinic, heart failure clinic and lipid clinic, in collaboration with doctors to optimize patient care. Moreover, there have been commendable efforts to introduce pharmacist counseling services in the Singapore community. Established in October 2007, The Hypertension, Diabetes and Lipids Clinics (HDL-C) is the first pharmacist-led chronic disease management clinic in Singapore, targeting the top chronic conditions in the country. With diabetes, hypertension, lipid disorders and stroke affecting one million Singaporeans, the HDL-C pharmacists work in collaboration with doctors, nurses and other allied health professionals to combat the growing burden of chronic diseases. The pharmacists provide care for patients with diabetes, hypertension and dyslipidemia based on the referrals made by doctors from the National Healthcare Group poly-clinics' 2nd tier diabetes clinic or chronic disease clinic. These were mainly funded by the government and Ministry of Health (National Healthcare Group Pharmacy, 2010). Many community pharmacies also run free patient counseling services e.g. smoking cessation service, and medication review service to help people improve medication use and reduce medication related problems. Some pharmacies also provide health screening checks for cholesterol, glucose and blood pressure, and advice on health related matters.

As part of the Memorandum of Understanding between Singapore Health Promotion Board (HPB) and the Pharmaceutical Society of Singapore (PSS) signed in January 2010, HPB will support PSS in developing, providing and funding relevant training for community pharmacists in accordance with the launch of the Pharmacist Health Ambassador Program. Pharmacists will be trained in a broad spectrum of health topics, including chronic disease management, weight management, health screening, osteoporosis and healthy lifestyle practices to provide more holistic care to their clients. The objectives of this collaborative effort serve to enhance patient education on adopting healthy lifestyles for prevention of chronic diseases via the knowledge expertise of pharmacists (Health Promotion Board Singapore, 2012).

Health institutions and governments across the world face the challenge of addressing the needs of an ageing population and a burgeoning healthcare budget, in the face of limited fiscal resources. With a growing ageing population in Singapore, new hospital facilities and expansion of professional manpower is needed to meet rising demand. There are currently close to 2,000 registered pharmacists in Singapore – with a national goal of increasing the numbers to a minimum of 3,000 in the next five years as the responsibilities of pharmacists become more complex and integrated into the healthcare team (Channel News Asia, 2011).

The quality of the pharmacy education and training has also been progressing, having a large push towards training clinical pharmacists and services in recent years - recognizing the crucial role of pharmacists in the multi-disciplinary healthcare team in the care of a patient. There is an increased trend towards attaining advanced Master programs and Doctor of Pharmacy

degrees – NUS has recently started a post-baccalaureate Pharm D program in 2010. More pharmacists are also gearing towards the Board of Pharmaceutical Specialties certification for added certification (Singapore Pharmacy Council, 2012).

In support of this growing trend for specialization and accreditation of clinical pharmacists, the Singapore Ministry of Health has developed a training grant over 5 years for overseas clinical residency training which started in 2008 (Ministry of Health, 2012). The areas of specialty include oncology, cardiology, critical care, infectious diseases, geriatrics and psychiatry. The fund aims to increase this pool of pharmacists to better complement the service delivery provided by clinicians in providing patients with better care and minimizing drug-related complications. A Pharmacist Specialization Register has been developed (Specialist Pharmacist Accreditation, 2012). The proper accreditation requirements include a formal specialty residency training program, board certification, work experience, and attainment of a post graduate degree beyond the NUS Bachelor's degree (i.e. Doctor of Pharmacy or Master programs).

Training experience in the United States: With the gracious support of the scholarship funding from the Ministry of Health, the primary author was able to train as an Infectious Diseases specialty resident from July 2009-June 2010 at an 800 bed academic medical center.

The department of Pharmacy is a culturally diverse organization of more than 250 people who focus their attention on caring for patients. It is assigned into four major areas of operation which include Acute Care, Ambulatory Care, Financial Management & Business Services, and Medication Policy & Research. It also has an outpatient pharmacy, a central

inpatient pharmacy and several satellite pharmacies to include Pediatrics, Operating Room, Oncology, and Investigational Drugs.

The pharmacy residency program has one of the largest classes in the nation with an enrollment of greater than 20 residents. The comprehensive nature of the program starts with a month of orientation, with intensive training and shadowing sessions with the clinical and staff pharmacists to prepare the residents for future responsibilities. This was interspersed with didactic clinical refresher courses at a School of Pharmacy, going through topics including pharmacokinetic principles, electrolyte replacement, code drugs and other useful information a resident would need to be up-to-date with prior to the year of rotations.

Typically PharmD graduates from the United States first undergo a year of Post-Graduate Year 1 (PGY1) residency training – with stipulated mandatory rotational experiences like hospital administration, critical care, internal medicine and drug information for example, along with other elective choices. PGY1 residents would then progress to PGY2 specialty residencies of various disciplines – including Infectious Diseases, Cardiology, and Oncology amongst many others. Pharmacy administration as a mandated part of the PGY1 residency program is focused on fostering leadership training and administrative perspective to the role of a pharmacist in a hospital.

Every pharmacist's job description is well defined and circumscribed in the hospital, to minimize overlapping of responsibilities. Apart from clinical specialist pharmacists, there are pharmacists who prefer to work in the evenings and those who are stationed permanently as operation specialists in the central pharmacy and IV room, dealing more with the distributive nature of the pharmacy workload. All clinical pharmacists attend daily ward

rounds with the medical team, and are responsible for all the pharmacotherapy issues for patients under their charge. Their involvement in all code situations and preparing code drugs is not currently a part of the Singapore pharmacist responsibility. This may be an area that can be considered in future training curriculum to better integrate the pharmacist's presence within the healthcare community.

The hospital has an efficient electronic medical and pharmacy documentation system, which pharmacists can also remotely access from home to follow-up with patient progress. Each clinical pharmacist has a tablet laptop, to facilitate ease of verifying electronic medication orders that technicians have processed through the system, and for easy follow-up of patients and monitoring the most current parameters and medication profiles while on rounds with the clinical team. There is a pharmacy documentation system which provides free-text communication across shifts, days, and between the pharmacists in the entire hospital. This facilitates continuity of care for the patient, minimizes medical errors and reflects the teamwork and professionalism of the pharmacists in between changing shifts. Singapore hospital pharmacies are currently in the process of converting to electronic medical documentations and prescriptions in order to improve communication between healthcare professionals to enhance patient safety.

The clinical pharmacist is always in close proximity to the medical team throughout the day. This facilitates availability for discussions on patient care and pharmacotherapy interventions that is time-efficient, supported also by a hospital wide paging system.

Therapeutic drug monitoring and pharmacokinetic interventions are a major part of the clinical interventions. All drug concentrations are electronically ordered by the

pharmacists. They are responsible for keeping track of the exact time of nurse administration, and ordering exactly for the peak or trough that coincides with phlebotomy rounds. Pharmacokinetic notes are documented formally in the electronic health record, so that clinicians on the team would be informed of the decisions and rationales made about the dosing regimen changes.

Apart from inpatient ward rounds, pharmacists are also involved in afternoon specialty consult services. For example, clinical rounds in the Infectious Diseases Consult service have a multi-disciplinary approach where they begin rounds at the microbiology lab, with the Microbiology directors and fellows available for expert opinion on culture data of the patients on the service. This is followed by a consult with the Interventional Radiology department, once again getting expert opinion on the interpretation of certain difficult diagnoses and imaging studies. These 2 pre-round discussions enhance the understanding and recommendation of the consult cases to the primary service team.

Benefits of Training in the United States:

The pharmacy residency program provides an excellent platform for consolidating one's foundation as a clinical specialist. Being an effective clinical pharmacist is about effective communication coupled with the right skills set and knowledge. The conducive environment and seamless network of electronic communication and documentation between pharmacists and the medical team helped to ensure timely pharmacotherapy optimization and monitoring for patient safety and care, facilitating the practice of 'pre-emptive medicine' of preventing errors in prescribing and not just 'reactive medicine' – correcting errors when the wrong drug or dose has been ordered.

This program aims not just to build clinicians, but to build character and confidence. Seminars on leadership, interviewing skills, healthcare reform and character building were a regular part of the program to foster a culture of pharmacy leadership and societal awareness.

Mentorship is an element that resonates with the residency program. Apart from having the overall residency director, and 2 residency coordinators overlooking the PGY1s and PGY2s respectively, residents also had direct specialty residency directors and preceptors. Residents are also appointed as Teaching Assistants (TAs) at the School of Pharmacy, teaching for 2 semesters for the pharmacy Year 2 and Year 3 students. Once again this consolidates effectiveness and confidence in imparting knowledge. Being a clinical specialist and leader is not just about educating ourselves, but also being a mentor and teacher of information to future pharmacists. One of the unique and strong features of the residency program is that the hospital enjoys a close relationship with the School of Pharmacy, giving residents the experience of being in the environment of academia – as all clinical specialists are appointed as adjunct clinical faculty in the School of Pharmacy.

The emphasis on formal presentations and seminars instilled the confidence and preparedness for public teaching and translates to a stronger foundation as effective clinical specialists. There is a minimum of three formal presentations, one of which is a 1 h Accreditation Council for Pharmacy Education (ACPE) – accredited Continuing Education (CE) seminar, where an hour-long CE is delivered to pharmacists from the community. Every clinical rotation includes seminar presentations of various topics and teaching discussions with medical and pharmacy colleagues, so an average resident can expect to do

a minimum of 5 formal presentations throughout the year. These sessions are coupled with feedback forms and peer evaluation forms to aid in improving for future presentations.

In line with the principles and practice of evidence-based medicine, all residents partake as primary investigators in their clinical research projects – usually involving a longitudinal pharmacotherapy project spanning the entire year, and ad-hoc projects from various rotational experiences. These clinical findings are presented at relevant national meetings.

The comprehensive residency program provides for a conducive learning and mentoring environment, and is beneficial not only because it strengthens clinical skills, but more importantly it tests the confidence and critical thinking capabilities of a pharmacist. The daily clinical rounds and instantaneous pharmacotherapy interventions trains one to effectively communicate professional inputs appropriately. The various formal seminars and teaching commitments at the affiliated School of Pharmacy further enhances a conviction and sense of professional ownership, allowing one to educate physicians and the healthcare team about the nuances of choosing one drug over another or one dose over another, with the goal of providing the most optimal evidence-based pharmacotherapy regimen based on the patients' clinical and financial background.

Structured and strategic residency training programs will guide the process and allow for evaluation of pharmacists to be the next generation of clinical specialist leaders in the rapidly evolving world of clinical practice and translational research, further distinguishing our niche roles as a healthcare provider in patient-care. This paper describes the pharmacy practice model and process one country is using to advance clinical pharmacy by providing pharmacy specialization residency

training opportunities to further optimize patient care. Table 1 shows the pathways from entry to speciality in

clinical pharmacy practice between Singapore and the United States.

Table 1 Comparison of pathways from entry to speciality in clinical pharmacy practice between countries

Topic	Singapore	United States
Entry level	High School + 2 yr of junior college	High School + pre-pharmacy college courses (2-4 yr)
Degree program	Bachelor of Science (Pharmacy) degree with Honors (4 yr)	Doctor of Pharmacy degree (4 yr)
Pre-licensing training	Pre-registration training (12 mo)	+Final year consisting of clinical rotations
Licensure	National	State
Postgraduate training	Post-baccalaureate Doctor of Pharmacy degree (2 yr; optional) Board of Pharmacy Specialists certification (optional)	Pharmacy practice residency (PGY1) Board of Pharmacy Specialists certification (optional)
Specialist	Specialist Pharmacist Registration with specific criteria of completing post-baccalaureate education, full-time specialty residency training with more than 3 yr of relevant experience – current recognized areas include cardiology, infectious diseases, geriatrics, oncology and psychiatry	Specialty pharmacy residency (PGY2)

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